-continued

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385                 390                 395                 400

Asn Phe Asn Gly Gln Asn Thr Glu Ile Asn Asn Met Asn Phe Thr Lys
                405                 410                 415

Leu Lys Asn Phe Thr Gly Leu Phe Glu Phe Tyr Lys Leu Leu Cys Val
            420                 425                 430

Arg Gly Ile Ile Thr Ser Lys Thr Lys Ser Leu Asp Lys Gly Tyr Asn
        435                 440                 445

Lys
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We claim:

1. A method for producing a botulinum neurotoxin light chain comprising: culturing, at a temperature of about 18° C., a host cell comprising an expression control sequence operably linked to a nucleic acid sequence encoding the botulinum neurotoxin light chain; expressing the botulinum neurotoxin light chain; obtaining a protein fraction from the cultured host cell; and isolating the botulinum neurotoxin light chain from the protein fraction, wherein more than 100 mg of botulinum neurotoxin light chain is obtained per liter of culture.

2. The method of claim **1** wherein the host cell is *Pichia pastoris*.

3. The method of claim **1** wherein the host cell is *Escherichia coli*.

4. The method of claim **1** wherein the botulinum neurotoxin light chain is non-toxic.

5. The method of claim **1** wherein more than 500 mg of purified botulinum neurotoxin light chain is obtained per liter of culture.

6. The method of claim **1** wherein about 1 gram of purified botulinum neurotoxin light chain is obtained per liter of culture.

7. The method of claim **1** wherein the purified botulinum neurotoxin light chain is catalytically active.

8. The method of claim **1** wherein the nucleic acid has the sequence of nucleotides 9-1337 of SEQ ID NO:4.

9. The method of claim **1** wherein the nucleic acid sequence encodes a botulinum neurotoxin light chain serotype A.

10. The method of claim **1** wherein the nucleic acid sequence encodes a botulinum neurotoxin light chain selected from the group consisting of botulinum neurotoxin light chain serotype B, botulinum neurotoxin light chain serotype C_1, botulinum neurotoxin light chain serotype D, botulinum neurotoxin light chain serotype E, botulinum neurotoxin light chain serotype F, and botulinum neurotoxin light chain serotype G.

11. The method of claim **1** wherein the nucleic acid has a total A+T content that is less than about 70%.

12. The method of claim **1** wherein the nucleic acid molecule encodes a polypeptide having an amino acid sequence selected from the group consisting of SEQ ID NO:47 and SEQ ID NO:21.

13. The method of claim **1** wherein the A+T content of any 50 consecutive nucleotides of the nucleic acid molecule is less than about 75%.

14. The method of claim **10** wherein the nucleic acid has a nucleic acid sequence selected from the group consisting of SEQ ID NO: 6, 8, 10, 12, 14, 16, 22, 26, 30, 34, 38, and 42.

15. The method of claim **10** wherein the nucleic acid has a total A+T content that is less than about 70%.

16. The method of claim **10** wherein the A+T content of any 50 consecutive nucleotides of the nucleic acid molecule is less than about 75%.

17. The method of claim **10** wherein the nucleic acid molecule encodes a polypeptide having an amino acid sequence selected from the group consisting of SEQ ID NO:7, SEQ ID NO:9, SEQ ID NO:11, SEQ ID NO:13, SEQ ID NO:15, SEQ ID NO:17, SEQ ID NO:23, SEQ ID NO:27, SEQ ID NO:31, SEQ ID NO:39, and SEQ ID NO:43.

18. The method of claim **1** wherein the DNA molecule has the nucleic acid sequence specified in SEQ ID NO:20.

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